

Comments - NBP Public Notice #24:

Broadband Measurement and Consumer Transparency
of Fixed Residential and Small Business Services in the
United States



CONTENTS

INTRODUCTION 4

RESPONSE - CONSUMER TRANSPARENCY REGARDING FIXED SERVICES 5

RESPONSE - MEASUREMENT OF FIXED SERVICES 7

RESPONSE - TRANSPARENCY REGARDING MULTI-UNIT BUILDINGS 24

RESPONSE - ADDITIONAL INFORMATION 25

Federal Communications Commission

445 12th St., S.W.

Washington, D.C. 20554

News Media Information 202 / 418-0500

TTY 202 / 418-2555

Internet: <http://www.fcc.gov>

DA 09-2474

Released: November 24, 2009

**COMMENT SOUGHT ON BROADBAND MEASUREMENT AND CONSUMER
TRANSPARENCY OF FIXED RESIDENTIAL AND SMALL BUSINESS SERVICES IN THE
UNITED STATES**

NBP Public Notice # 24

PLEADING CYCLE ESTABLISHED

GN Docket Nos. 09-47, 09-51, 09-137

INTRODUCTION

Epitiro is pleased to provide a response to the FCC's document Broadband Measurement and Consumer Transparency of Fixed Residential and Small Business Services in the United States.

Since 2000 the company has developed the technology and know-how to analyze broadband services from a consumer perspective. Having acquired leading European ISPs as clients, Epitiro has met the needs of industry by inventing various practical means of acquiring data and the necessary tools and expertise required to design test strategies and analyze data.

The responses to the FCC questions share both the company's knowledge and leading edge capability. Where more information on a topic is desired, Epitiro will be pleased to provide further insight.

ABOUT EPITIRO

Epitiro is the global leader in broadband benchmarking providing subscriber experience insight to ISPs, MNOs, media providers, multi-national corporations and government regulators. Clients such as the OECD, Ofcom, Vodafone, Orange, Virgin Media, Telecom New Zealand, Telefonica O2, Tiscali, Singapore IDA, Saudi Telecom Company, Bahrain Telecom Regulatory Authority and many others benefit from Epitiro's coverage of fixed and wireless broadband performance.

Founded in 2000, Epitiro has headquarters in Cardiff, Wales, UK.

RESPONSE - CONSUMER TRANSPARENCY REGARDING FIXED SERVICES

1. In the 2009 Consumer Information and Disclosure NOI, the Commission described the types of information that consumers need in order to (1) choose a provider, (2) choose a service plan, (3) manage the use of the service plan, and (4) decide whether and when to switch an existing provider or plan.² We seek comment on how that framework should factor in to development of the National Broadband Plan for Fixed Services.

Epitiro advises that the FCC adopt a standard methodology for rating ISPs based on key metrics which can be i) easily understood by consumers for assessing or selecting a broadband service, ii) indicative of network infrastructure performance and capability and iii) are indicative of the actual quality of experience of popular tasks such as web surfing, email, VoIP, game playing and downloading media.

2. What information should providers display and communicate to potential new customers when advertising offerings?

From a performance viewpoint, the key statistic is actual average TCP Download Speed achieved versus the headline or package speed of the service. This should be stated in context of a provider's traffic management policies which a provider may invoke on certain types of traffic.

How will that information vary by format (television vs. online, etc.)?

Epitiro is not expert in advertising media communication however the information above can be stated succinctly in any medium.

3. What information and data should providers display and communicate to existing customers?

In addition to average TCP Download Speed and Traffic Management Policies, metrics on TCP Upload Speed, Ping, Packet Loss, Jitter, and HTTP Upload/Download speeds would be useful for a technically inclined customer.

These metrics could be further developed by associating them with typical tasks and thus be understood by the greater public. For example, Average TCP Throughput Speed could be stated as Average Time to Download a 2 Hour Movie.

How will information provided vary by interaction (call center discussion vs. bill, etc.)?

No comment.

What tools could service providers offer to customers to monitor performance?

Epitiro would recommend a customer tool set that i) estimates the potential service quality a customer is likely to receive prior to purchasing a broadband service ii) monitors the performance of services for each customer iii) does not interfere or compromise customer experience. Customer tools need to be practical, easy to acquire and designed for use by the general public.

Epitiro's www.isposure.com website is an example of a public facing tool that can be branded and offered to customers by ISPs for post sales assessment of services.

4. At what level will the information and data be comparable for consumers?

Epitiro recommends that the FCC implement a standard methodology for measuring TCP Download Speed and a format for stating traffic management policies.

a. What data is helpful for consumers in comparing providers while not placing undue burden on providers?

Providers could easily state the percentage of actual average TCP Download Speed delivered versus 'up to' advertised speed of the package during peak and off-peak times of the day. This would require a consumer experience measurement system, available from Epitiro and others.

Providers can also state traffic management policies with clear examples of how it will affect or not affect the consumer.

5. How do we ensure that consumers have increased transparency and adequate privacy?

The measurements Epitiro refers to are concerned with the ability of the infrastructure to meet performance criteria. To that end privacy details beyond what a provider may already have on file (name, address, phone number, means of payment) are not required. Epitiro's test methodology does not require private details for either the consumer to test their line or the FCC/ISP to test network performance, thus full transparency without invasion of privacy is possible.

6. What reporting mechanisms and metrics are appropriate to promote transparency?**What data should providers report, how frequently and to whom should they report?**

The FCC should be informed on key performance indicators on a regular basis for the purposes of understanding actual service levels versus those advertised and charting overall national improvement over time. In order to have access to comparable results across all providers the FCC should define (or have defined) standard methodologies for measuring performance.

Consumers should be generally informed of average performance, again based on standard procedures, with access to a means of understanding the performance of their services as delivered.

RESPONSE - MEASUREMENT OF FIXED SERVICES

1. What measurements are typically performed by ISPs today to track network performance?

ISPs are concerned with their available bandwidth versus consumer demand, reliability of services and interconnectivity with other networks. It is not common for ISPs to measure and monitor speeds as experienced by their subscribers however.

For bandwidth, speed measurements are the chief metrics used consisting of a measurement of upload and download speed, based on TCP throughput or HTTP speed.

Reliability can be measured using a number of metrics including connection failures, variance of speed, packet loss and out-of-tolerance monitoring of other technical aspects.

Epitiro's **ISP-I** system has a comprehensive set of Key Performance Indicator metrics used for analysis of broadband services. Epitiro's ISP clients utilise ISP-I for consumer-centric performance testing. The broadband communications testing model is used for setting benchmarks, charting progress and also day-to-day network management. With a range of probe deployment methods, ISP-I is able to analyse broadband services thoroughly and from the perspectives of:

- Actual broadband line potential
- Service levels delivered to a controlled test group of customers
- Service levels experienced by the general population
- Core network performance

Epitiro's ISP clients focus on end-to-end performance of their network infrastructure from the customer perspective. Measurements are typically taken from a range of aggregation points within the network, starting at the customer premises (including last mile), and moving back toward the various aggregation points right into the core network. Epitiro provide a hierarchy of testing models to facilitate testing at each network layer.

Network Performance measurements typically include each of the following:

PRIMARY NETWORK LAYER METRICS

- Core Network Download Capacity (Multi-stream, TCP)
- Public Internet Uplink Capacity (Multi-stream, TCP)
- Core Network Latency
- Public Internet Latency
- Core Network Packet loss
- Public Network Packet loss
- Core Network Jitter
- Public Network Jitter

NETWORK MANAGEMENT PRACTICES – TRAFFIC & PROTOCOL SPECIFIC TESTING

- File-sharing/P2P Protocols such BitTorrent, LimeWire (based on downgraded QoS)
- IPTV testing (based on upgraded QoS)
- VoIP testing (based on upgraded QoS)

APPLICATION SPECIFIC METRICS

- Web Browsing Speed (Downlink Capacity of HTTP)
- Web Upload Speed (Uplink capacity via HTTP _POST)
- VoIP Quality using Mean Opinion Score MOS (ITU P.800)
- Email Performance

a. Technologies used? and b. Measurement methodologies (direct, sampled, etc.)?

The test industry has a range of devices used to measure IP metrics though disparate devices are not a practical means of executing network management or understanding overall performance.

With respect to measuring and monitoring IP network performance in terms of quality of experience, a complete solution needs to consist of the following;

- A means of collecting KPI metrics from any point in the network, including customer premises, to assess network infrastructure performance
- The ability to measure the actual performance of applications such as web surfing, email, VoIP, game playing and media downloading
- A measurement database to store millions of test results
- A database analysis 'dashboard' for accessing and analyzing the data.

Collecting KPI metrics and Measuring Common Applications

Epitiro has designed a suite of hardware and software technologies to address the various types of information collection required by national regulators, ISPs, network operators and other industry bodies.

Each probe type is capable of running the Broadband Test Application software whilst some probe types are capable of further benchmarking, network management analysis, popular application analysis and diagnostic measurements. The hierarchy ranges from a massively scalable software-based probe, deployed to subscriber PCs, through a small form-factor probe that can be deployed in large ('000s) numbers to customer premises, and finally 1U hardware probes that can be deployed at the various access aggregation points (DSLAM/BTS /Fixed WiMAX/OLT/CM) and beyond to the Metro, Core and Transmission networks.

ISP-I can measure the following key performance indicators and applications;

IP Infrastructure

Synchronization Speed

HTTP Download / Upload Speed

TCP Download / Upload Speed

FTP Download / Upload Speed

Traceroute

DNS Time Resolution Time

Ping Time

Packet Loss

Jitter

Failures on above metrics

Location

Date

Time of Day

IP Address

Probe ID

ISP

ISP Package

Test Device

CPE or Consultant Hardware information

VoIP Application

Call Setup Time

Call Duration

MOS (Voice Quality)

Audio Delay

Volume Differential

Background Noise

UDP Fixed Rate

RSSI (Mobile, WiMAX)

Cell ID (Mobile, WiMAX)

SNR, SNIR (WiMAX)

CNT, CNIR (WiMAX)

Base Station ID (WiMAX)

Preamble ID (WiMAX)

Traffic Management Analysis

Media Download

Gamin/VoIP

Video Test Application Metrics

Start-up time

Non-playing time (msecs)

Re-buffering Time (msecs)

Bandwidth/Throughput (kbps)

Delivered Bandwidth

Delivered Frame Rate

Frame Drops

Packet Loss

Messaging

Email

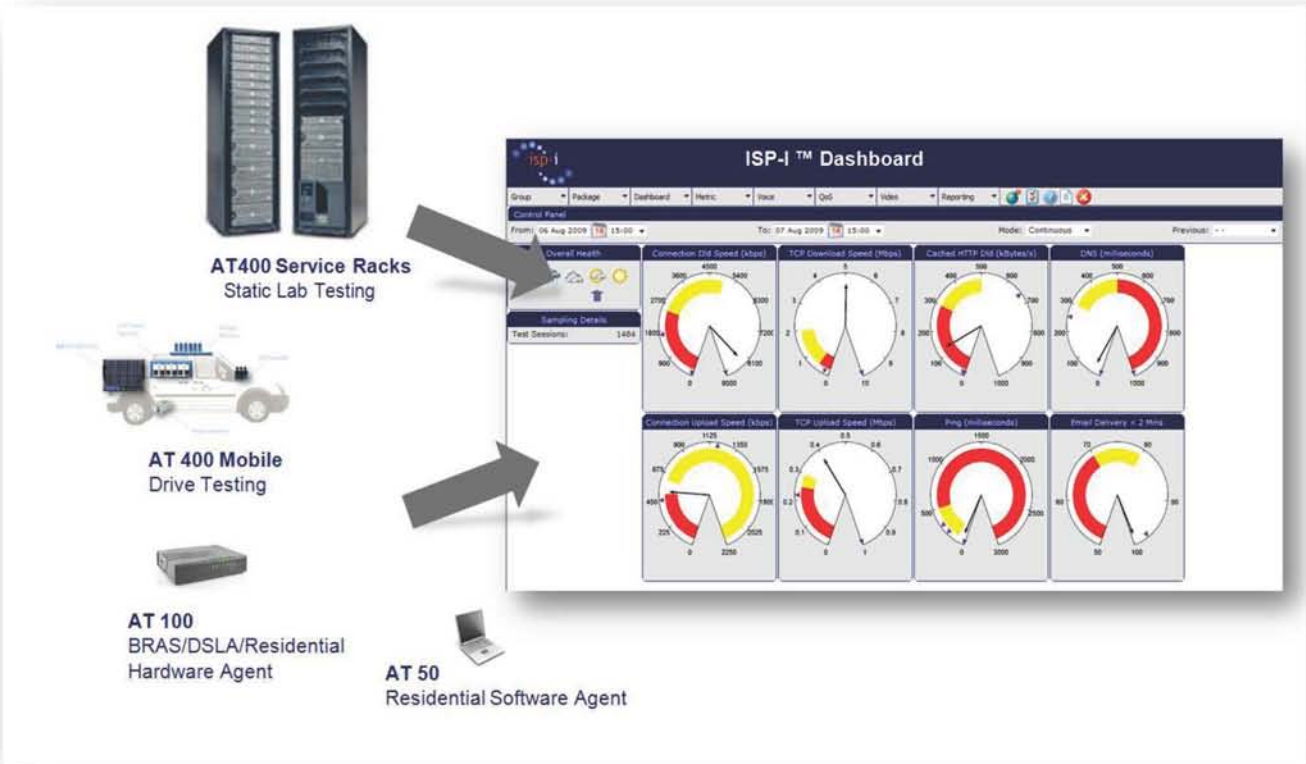


Figure 1. AT400 Hardware Probe Before the Last Mile

2. Going forward, how should Fixed Services be measured?

Epitiro suggests a combination of software and hardware-based probes should be deployed at a range of network locations as the means to collect the necessary key performance indicator (KPI) data for the FCC to arrive at a thorough understanding of fixed (including fixed wireless WiMAX/Clearwire) internet service performance nationwide and on a per-demographic basis.

a. What parts of the network should be measured -- what exact starting and ending points are most useful and actionable for consumers, regulators and providers (See exhibit 1 below for a network diagram and associated definitions for use in responding to this question)?

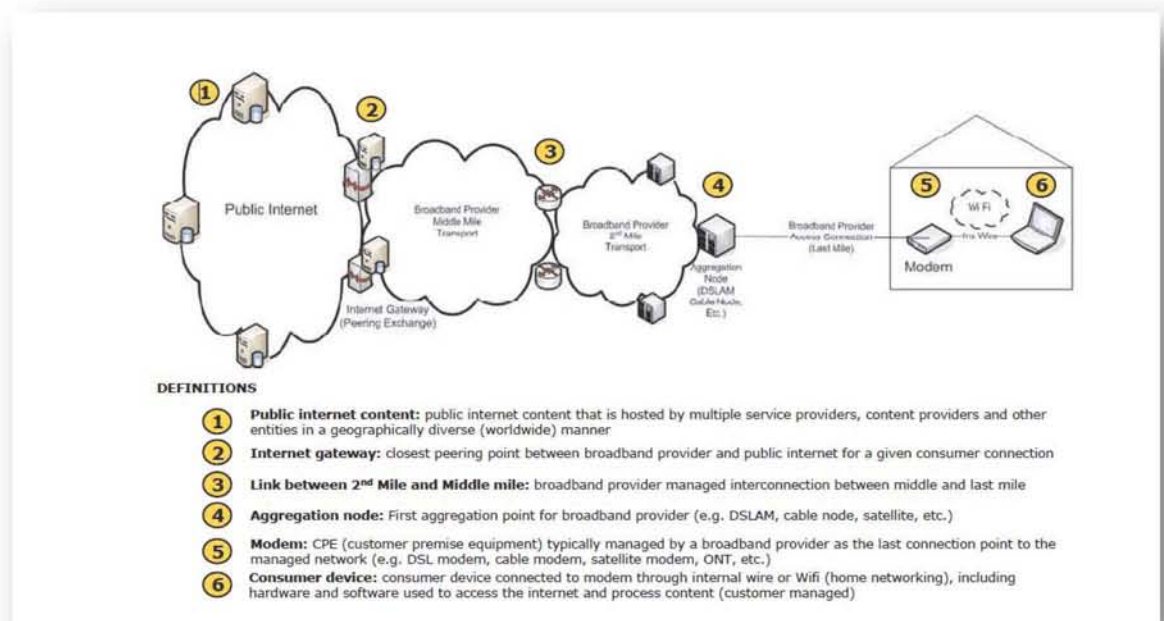


Figure 2. FCC Definitions Diagram

For a customer view, it is important to understand if their ISP is performing according to terms and conditions of a contract. Hence measurement from the residence/office either at the modem (5) or laptop (6) is desirable as it reveals the service as delivered. Note that an end-point test server may be installed at location (1) for the purposes of establishing end-to-end testing from a valid residential location to a valid public location, and thus be representative of typical customer usage. Epitiro explains in this section the software and hardware technology available for this model of measurement

Whilst the FCC may also be interested in CPE views and CPE to Public Internet (end-to-end) views, views at each aggregation point are also informative as they reveal the ability of each portion of the network to perform. Epitiro explains in this section options for measuring at all points above.

DEPLOYMENT OF HARDWARE PROBES TO MEASURE MAXIMUM PERFORMANCE FROM ISP NETWORKS AT LOCATIONS (2), (3), (4)

The purpose of this model of probe deployment is to understand the capability of ISP networks without the degrading affect of the “last mile”.

Hardware probes are installed at the aggregation point in the network before the “last mile” comes into play. The probes would be deployed across the USA at selected network points that would best capture an overall view of performance.

By deploying hardware probes (AT400 shown) in locations near or within the Remote Terminal (DSLAM, MSAN), Cable Node, Fiber Splitter or BTS of the broadband service and testing capacity and latency into the operator's core network, before the traffic leaves for the peering or transit networks, the FCC could truly understand an ISP’s ability to deliver stated or advertised “up to” speeds.

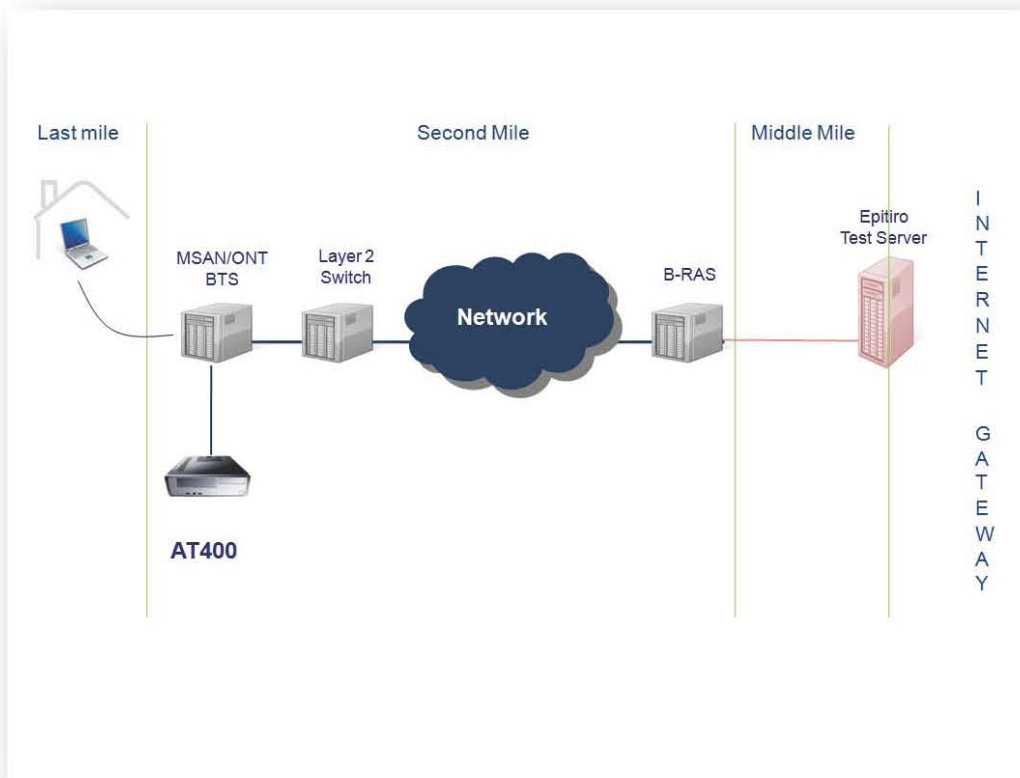


Figure 3. AT400 Hardware Probe Before the Last Mile

RATIONALE

Our experience of working with many of the world's leading operators has shown that ISPs may suggest that under-performance is due to parts of the network outside of their control – primarily the “last mile” and “the internet”.

There is also a tendency to sell services, particularly xDSL, with the “up to” limit based on the theoretical limit of the technology. This has the potential to be misleading for consumers. The “up to” limit should be based on the actual capabilities of the individual ISP’s network rather than on the theoretical limits of the access technology. It should be based on an ISP’s capability to deliver under existing network conditions – excluding the “last mile” and “the internet”. As an example, the following is an overview of the upper rates achieved by an incumbent operator in Europe using their ADSL2+ network.

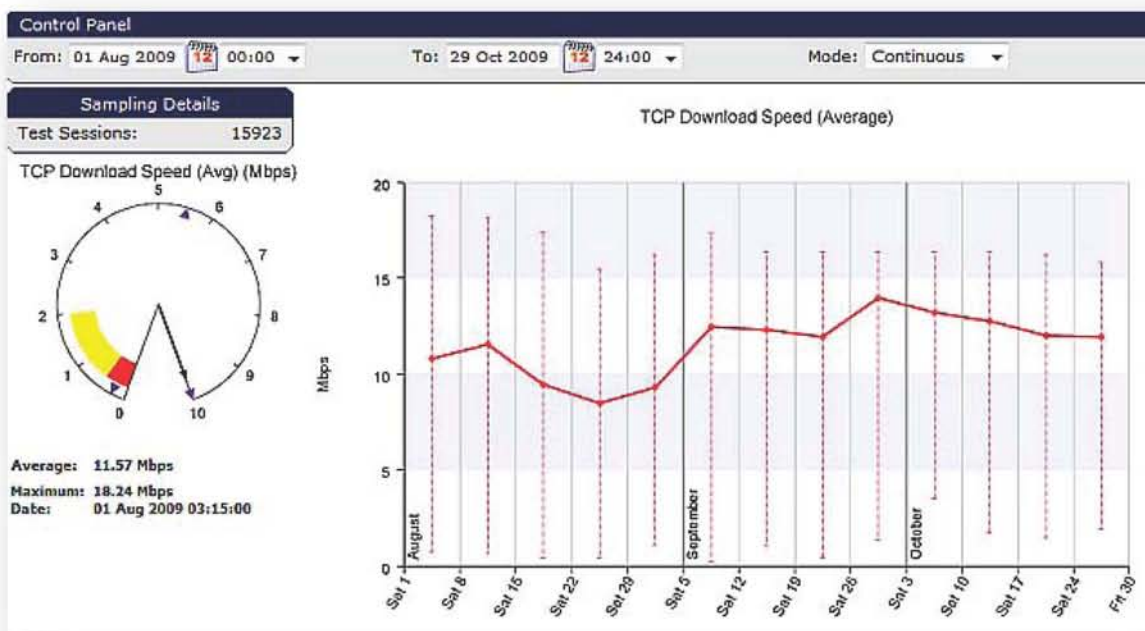


Figure 4. Sample Daily Variance of TCP Download Speed

These controlled ADSL2+ tests were made from the Remote Terminal (MSAN), excluding the “last mile” and “the internet”, and into the Core network. The graph shows that in a 3-month period the average attained speed was 11.57Mbps and the peak performance was 18.24Mbps, attained at 03:15 on August 1st.

CONSIDERATIONS

Monitoring Fixed-line services (Copper, Coax & FTTx) services is reasonably straight-forward. Epiteiro has experience of deploying equipment in Telco exchanges with a short copper run from the MSAN or DSLAM. Wireless broadband services will require identifying sites with excellent signal, ideally within a suitable distance of the BTS so as not to be affected by “wireless last mile” degradation.

BENEFITS

- Not subject to variance in “last mile” or “the internet” conditions – the deployment answers the question “what is the maximum level of service that US operators can actually deliver to customers in ideal conditions?” without needing to consider last-mile variance and internet-specific issues – both of which are out of an ISP’s control.
- Fully-controlled “laboratory conditions” model – offering accurate, scheduled (24x7) and future proof testing of a large range of performance metrics in a controlled model that offers excellent data in a reliable time-series.
- Provides a future-proof way to track the evolution of US broadband capability over time
- Monitors all Fixed and Wireless Broadband services with a standard testing framework across all broadband technologies
- Not subject to individual users' network usage habits
- Ideal for Traffic Management Policy analysis/changes
- Internet services can be tested for both capability (i.e. throughput, latency) and ability to handle applications (VoIP, Video, Email)

EXPECTED CRITICISMS

When taken in isolation this model would provide an understanding of true (rather than theoretical) maximum speeds the broadband networks are capable of delivering. Thus it is useful for measurement and benchmarking of networks.

If this model is referenced as a means to determine the “actual” speeds delivered to consumers then it will draw criticism on several fronts.

Firstly, critics may suggest that the ISPs will tweak their lines as they’ll know where the test points are located. Secondly, due to economic scaling issues, hardware probes may not be deployed in sufficient numbers to arrive at a statistically sound conclusion on actual consumer experience per state, per county, per city etc. Finally, as it is not located at the consumer premises, it will be argued that it is an inaccurate means of measuring consumer experience.

RESIDENTIAL DEPLOYMENT OF ROUTER-BASED TESTING PROBES FOR MEASURING NATIONAL CONSUMER EXPERIENCE FROM LOCATION (5)

The purpose of this model is to understand the actual service performance, on average, to the general consumer public.

Hardware probes (AT100 shown) would be shipped directly to consumer panelists across the USA where they are connected to end user's cable or ADSL modem.

Panelists can be recruited via a marketing research agency or directly via media awareness. Epiteiro has had success with both methods and developed supporting internet web sites for registration and ordering. Owing to the high interest in internet performance across all demographics, Epiteiro's experience in recruitment of panelists has been very positive.

Panelist selection criterion is directly related to the areas of study and degree of granularity the FCC desires. Candidates may be screened or subsequently analyzed by ISP supplier, service plan, location, distance from exchange, internet usage habits, age and other demographics.

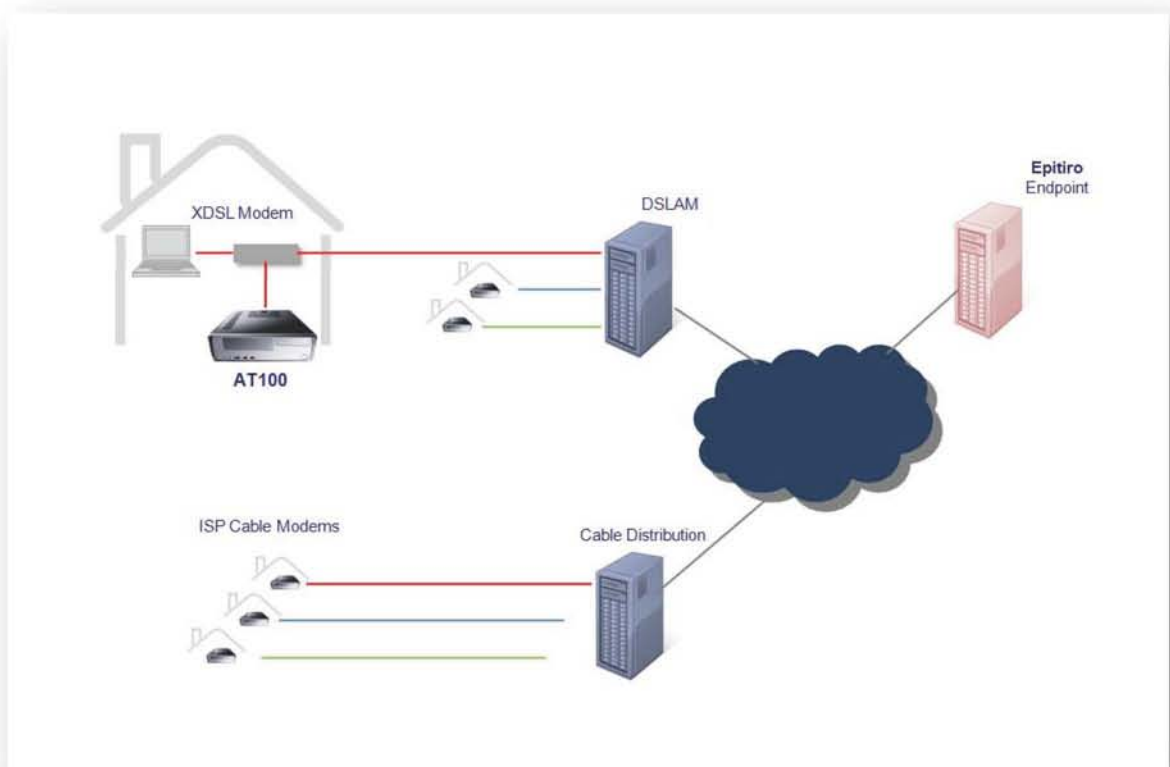


Figure 5. Residential Deployment of Hardware (AT100) Probes

BENEFITS

- Accurate and scheduled (24x7) testing of a range of fixed line internet services as delivered to the consumer
- The measurement is isolated from the consumer's PC

DISADVANTAGES

- Deployment costs may lead to a restricted view of the market in terms of the numbers of ISPs which can be tested, and the number of participating panelists. Thus the granularity of conclusions which can be drawn on a per state, per county and per city basis may be limited. The FCC would need to focus on a small range of key ISPs or else it would quickly become expensive and challenging from a logistical and on-going management perspective.
- No current measurement support for Wireless Services (3G, LTE, Mobile WiMAX)
- Significant (25%) over-subscription to panelists will be required to offset units "lost-in-field"

EXPECTED CRITICISMS

The chief criticism of this approach is the size of the sample vs. the conclusions drawn.

Ofcom's *UK Broadband Speeds Survey 2008* (January 2009) stated that of the 2,100 devices distributed, 1,600 devices were actually used across 6 leading ISPs, while the *UK Broadband Speeds Survey 2009* (July 2009) was based on 1,621 devices across 8 ISPs.

Statistically 1,600+ devices are sufficient to accurately conclude overall average speeds delivered.

However, the Ofcom reports met with objection from some ISPs on the basis that insufficient samples sizes were available for meaningful analysis of either an individual ISP or understanding performance by urban, sub-urban and rural area.

Thus this model is fine as long as conclusions are based on a sufficiently sized pool of data.

NATIONAL DISTRIBUTION OF SOFTWARE PROBES FOR DETAILED ANALYSIS BY DEMOGRAPHIC / ISP FROM LOCATION (6)

The purpose of this model is to understand, by demographic and ISP, the actual service performance to the consumer public.

Software probes (AT50 shown) would be downloaded by interested broadband consumers throughout the United States, and also by a carefully screened consumer panel. The scalability, accuracy and inclusiveness of this approach address areas of interest that cannot be practically serviced with a hardware-only approach.

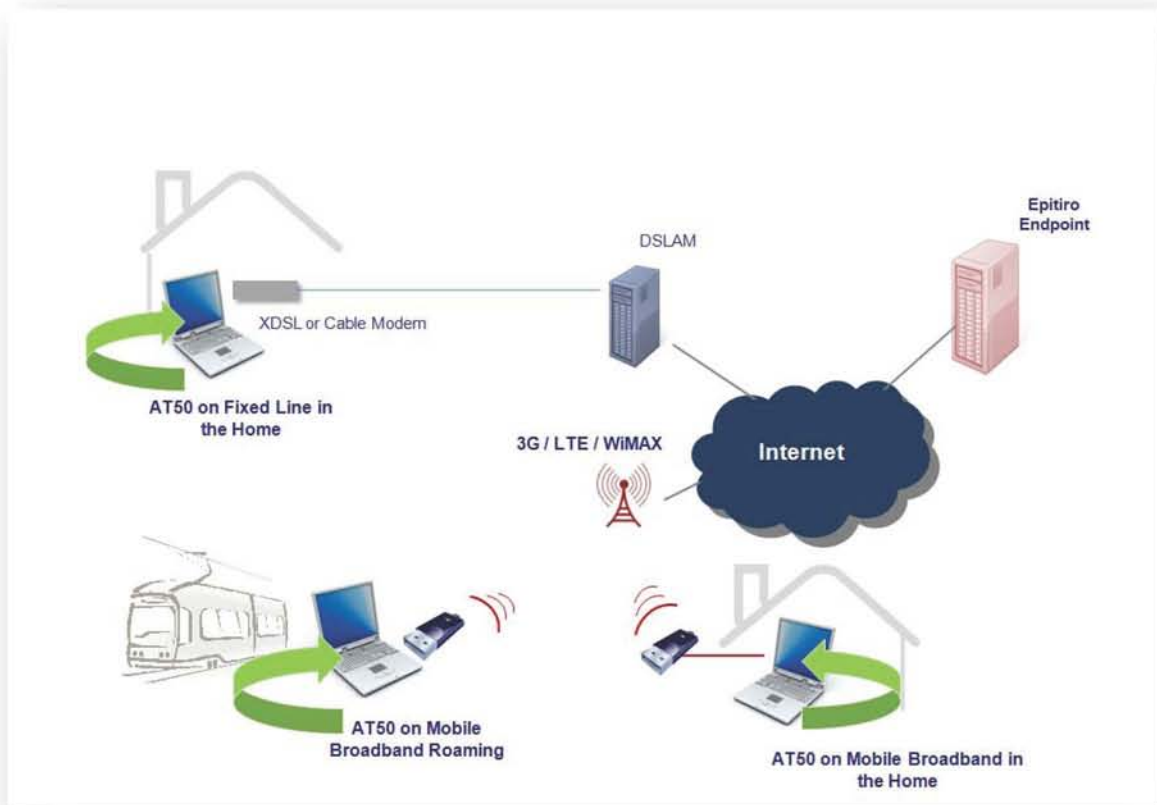


Figure 6. AT50 Software Probe in Fixed Residential, Mobile Residential and Mobile Roaming Testing

BENEFITS

- Quickly enables a data collection solution to be implemented. The FCC could expect to have thousands of software probes reporting data within a few weeks of commencing the project.
- Scales economically
- Large sample size allows more-granular areas of research; by ISP, by state, county, city, age, rural/urban etc.
- Accurate and scheduled (24x7) testing of a range of core performance metrics that has been proven to offer excellent data
- Achieving statistical significance is inexpensive and the model is inclusive – no need to focus on a small range of key ISPs
- Full Support for Fixed and Wireless Services (3G, WiMAX, LTE) using the software probe and a common testing platform across all backhaul technologies

EXPECTED CRITICISMS

The chief criticism of a software probe is that it is reliant on and subject to limitations of the consumer's pc or laptop. Epiro has considered this and designed the software to ensure that tests are not affected by the environment. Evidential proof and trial results comparing broadband data collected by hardware and software probes is available from Epiro.

b. What performance characteristics should be tracked across these starting and ending points including but not limited to peak and average throughput, upload and download speeds, and the extent of network outages?

Epitiro recommends the following performance characteristics should form the key performance Indices. This is based on our experience and feedback from other regulators, consumer bodies and consumers around the world.

Primary Network Layer Metrics

- Core Network Download Capacity (Multi-stream, TCP)
- Public Internet Uplink Capacity (Multi-stream, TCP)
- Core Network Latency
- Public Internet Latency
- Core Network Packet loss
- Public Network Packet loss
- Core Network Jitter
- Public Network Jitter

There is also potential for network management studies as well as traffic and protocol specific testing. These would be based on FCC Policy and allow an understanding of the scope and levels of traffic management being applied by the ISPs. It's important to understand that ISPs will apply and evolve Layer-2 QoS to certain traffic classes as their networks and range of applications evolve (e.g. AT&T upgrading IPSEC to ensure good voice services for its Femtocells). Examples would be:

- File-sharing/P2P Protocols (BitTorrent, LimeWire)
- IPTV QoS Auditing
- VoIP QoS Auditing (e.g. SIP, Femtocell, Vonage, Google Voice)

c. If actual speeds are tracked, how should they be measured and reported?

Speeds should be measured in both directions and by application type.

TCP download speed should be measured in such a fashion that the network would consider the traffic type to be VoIP, P2P, video streaming, game play etc. and invoke traffic management accordingly.

Test should be performed throughout the day and certainly during peak demand periods to understand the likely consumer experience, and also during low demand periods to understand network potential capability.

Demand on internet services vary by day of the week and month of the year thus the monitoring should be continuous.

Understanding a snapshot of performance levels can be accomplished with a large consumer panel and deployment of infrastructure probes over the course of a few weeks. Understanding trends and improvements over time would require data recorded continuously and over a longer period.

d. If quality of service is to be tracked, how should it be measured and reported?

Epitiro has a model for weighing the combination of leading key performance indicators and presenting the data as a Broadband Quality Index. This scale of service, based on a scale of 1 to 10 where 10 is perfect, provides an easy-to-understand and meaningful assessment of ISP quality of service.

e. If the effects of network management practices on customer experience are to be tracked, how should they be measured and reported?

ISP networks need to be tested to understand the extent of traffic management policies in context of popular applications. Whilst web-surfing is unlikely to cause throttling-back of services, applications such as P2P downloads/uploads, VoIP, Femtocell Service, large media file downloading and game playing may be triggers for traffic management. Hence tests that simulate these applications must be executed, especially during peak demand periods.

3. How should this measurement system be configured?

Epitiro recommends a comprehensive monitoring solution, supported by dedicated staff and a means to collect, manage and analyze the data.

Epitiro would recommend probes be deployed at key aggregation points and consumer premises (panels), to collect performance data that provides both end-to-end and 'any mile' analysis. The 'network' of monitoring probes should be supported by a 24-7 staff dedicated to ensuring it remains up and running.

The network of monitoring probes would generate a considerable amount of data on an hourly basis and thus a suitable data centre would be required with dedicated support staff.

An ability to review and analyze data by means of an on-line control panel would also be required. This would provide the means to review the data by geography, demographic, package type etc., create ad hoc reports, drill down to discover root causes of issues, perform statistical analysis etc.

The means to forward data streams to other experts for off-site analysis would also be beneficial.

In addition, consideration of the growing mobile broadband market is important as consumers and operators use the same terminology ('up to' speed) in descriptions of services. Epitiro recommends the FCC allow for the ability to extend its ultimate fixed monitoring and standards to cover all broadband services for the sake of achieving a common understanding from industry through to consumer.

Epitiro has proven technology and experience to address these matters.

a. What technology approaches should be used to measure Fixed Services?

Epitiro recommends active testing based on a 'typical consumer usage' model. A list of Key Performance Metrics is referenced in Question 1.

b. How should the technology approach be composed (customer panels vs. random samples vs. specific geographies, etc)?

There are advantages and drawbacks to both screened panels and volunteer panels for the purposes of measuring services from the premises;

Screened panels offer higher assurances of demographic information that is not readily measurable using technology and probes. For example, a screened panellist can have their home address manually confirmed. The difficulties with a screened panel are the costs and logistics of scaling the panel to a sufficient size where analysis by demographic can occur. Yet screened panellists do remove doubts regarding certain aspects of the data.

c. What role should existing governmental and other broadband measurement efforts play?

What gets measured gets managed

4. Who should host, audit and track this measurement? Examples include:

a. Industry-led initiative with third party auditing?

Epitiro's experience thus far is that industry-led initiatives have not been successful in implementing a self-reporting auditing scheme. In the UK Ofcom has approached both fixed and mobile operators with an aim to finding a common, standard way of reporting performance. Thus far nothing has been agreed and the matter isn't being pursued.

Further obstacles could be anticipated as any ISPs that find their performance data unflattering may seek to stall reporting of findings or cease to take part.

b. Third-party-led initiative with FCC or third-party auditing? c. FCC-led initiative end-to-end?

In our experience a proven model would be a Regulator-led model with either Regulator or Third Party Auditing "FCC-led initiative with third-party auditing". The benefits of having a trusted third-party involved are independence and accountability.

By removing the need for leadership from within the industry, or a third-party, and focusing on this as an FCC-led initiative the project would enjoy the benefits of a close association with the FCC but also be in a position to test and measure independently with a level of expected support from all parties.

For example, Ofcom's Voluntary Code of Practice, where ISPs voluntarily sign up and agree to do business in a certain fashion beneficial to consumers, has been an overwhelming success.

Epitiro has experience in providing national broadband monitoring solutions for regulators that take the initiative.

Epitiro provides the New Zealand Commerce Commission with a quarterly report which details the state-of-play of the New Zealand broadband industry. Initially based on hardware probes, the Commission will now also use data from the Ispouse probes. A copy of the latest New Zealand report can be found at:

<http://www.comcom.govt.nz/IndustryRegulation/Telecommunications/MonitoringandReporting/DecisionsList.aspx>

Singapore National Internet Measurement Index (NIMI) Epitiro currently provide Singapore Infocomm Development Authority with a real-time performance data, 24/7, which details the state-of-play of the Singapore broadband industry. The data is captured 24/7 and publish via the IDA's website every day. Please see:

<http://www.ida.gov.sg/Publications/20061213184450.aspx>

5. What are the benefits and costs of measurement for providers, regulators, end-user consumers/customers and others?

Epitiro suggests that a nationwide methodology for measuring fixed broadband services will benefit all concerned.

Consumers will benefit by making an informed purchase of broadband services and enjoying the continuous trend of improvement that occurs in a competitive market.

Providers will benefit from competitive analysis by improving and positioning services to meet various market segments. Epitiro's clients enjoy not just competitive benchmarking analysis but the means to address customer-affecting faults in real time.

Regulators can ensure ISPs are performing to guidelines and standards and readily process consumer complaints by referencing data at their finger tips.

Finally, government departments that are relying of the U.S. broadband industry to improve coverage, performance and capability will have the means to chart those improvements over time.

Epitiro can provide indicative costs based on further discussions with the FCC.

a. What are the benefits (e.g., transparency, increased data, network comparability, etc.)?

For consumers the benefits are value for money and assurance that the service meets expectations. For governments, the socio-economic importance of broadband is indisputable.

b. What are the costs (e.g., hardware costs, usage of the network, consumer hassle, etc.)?

Epitiro can provide indicative costs based on further discussions with the FCC.

c. What are the privacy/security considerations?

The risk in regards to privacy and security is minimal for the measurement techniques discussed and in consideration of an FCC-led initiative assisted by a reputable third party.

The name, address, phone number of panellists could remain with the third party and hidden from the FCC or vice versa.

Technically, a residential probe or software could be the target of hackers thus suitable protection would need to be assured. Epitiro can discuss its ability to provide secure residential probes (both hardware and software) with the FCC.

6. How should measurement vary among different demographic groups?

It is common knowledge that service levels to rural locations using ADSL (copper) connectivity will experience a reduction in bandwidth with distance from the DSLAM. Thus measured speeds, on average, could be slower in rural communities. Consequently the FCC should have the means of measuring line attenuation and router sync speeds. Variance in speeds for ADSL subscribers throughout a day could be the result of congestion in the 2nd or Middle miles.

Cable broadband subscribers that have speeds vary throughout the day are likely experiencing contention for service locally. This is within the capacity of the serving ISP to resolve through improving local infrastructure.

a. How can we ensure rural geographies, including tribal lands, and smaller providers are accurately represented?

Epitiro has previously described the use of a software probe that is deployed via a website to consumer pc's and laptops. This methodology scales to tens of thousands of probes economically and rapidly to provide geographical coverage and inclusion of all providers.

User inclusion can be considered critical to achieving the goal of collecting universal, empirical data from across the entire spectrum of users – from major cities to divergent rural populations - and can be best accomplished by employing both a systematic and “open invite” model to representative users involved in the field-testing. Through a 'free-to-consumer' software deployment model (which benefits the consumer by providing information on their particular broadband connection), Epitiro can provide full and total coverage across any rural geography including tribal lands and smaller providers. The company has deployed software probes in numerous countries amassing over 60, 000 software probes worldwide.

For example, In Oct 2008 Epitiro launched a software probe network from its www.isposure.com website based on a single PR announcement. There were over 2,000 downloads within 24 hours and at its peak in March 2008 there were over 25,000 panelists from each county in England, Scotland, Wales and Northern Ireland reporting on over 200 major and smaller ISPs.

RESPONSE - TRANSPARENCY REGARDING MULTI-UNIT BUILDINGS**1. How should information concerning fixed service capabilities in multi-unit residence buildings be communicated to potential investors, home-owners and renters at the point of sale/ rental?**

Buildings may be wired for direct service to consumers or the landlord may act as a 'last mile' provider. Regardless, the models Epitiro has described in this document can apply. The 'last mile' aggregation point now is potentially with the landlord of the buildings and residential monitoring can occur from tenant premises.

An economical probe at the building's aggregation point could report to the ISP (under a maintenance contract arrangement) or to a central network operations centre run by the landlord. Tenant service levels could also be monitored using a software or residential hardware probe which reports either directly to the ISP or the landlord, depending on the nature of the ISP service contract.

RESPONSE - ADDITIONAL INFORMATION

In addition to written responses, we encourage submission of any data, charts or proposed plans that can be entered into the public record for purposes of building a fact base on this subject. All parties with knowledge and interest are encouraged to file.

Epitiro has conducted similar analysis projects and includes the following reports for review by the FCC;

- Ireland Internet Performance Index
- Australian Internet Performance Index
- UK Mobile Broadband Analysis
- New Zealand Commerce Commission Quarterly Report

Epitiro (UK) Ltd
10/11 Raleigh Walk
Waterfront 2000
Brigantine Place
Cardiff
CF10 4LN

www.epitiro.com